Output-Based Emission Regulation and Allowance Allocation

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Overview of the Issues

◆ What is an output-based regulation?

◆ Why adopt output-based regulation?

- – To recognize efficiency: CHP
- – To recognize renewables

◆ How do I develop output-based regulations?

◆ Who else has developed output-based regulations?

What is an Output-based Regulation?

◆ Output-based regulation relates emissions to the productive output of the process

◆ Output-based emission standards

– Conventional emission standards that account for the emissions benefit of efficiency.

◆ Output-basis for allowance allocation in emission trading programs.

– Provides more allowances to more efficient plants. Can also allocate to renewable generators and efficiency projects.

Output-based Units of Measure

For this type of energy production...	Using...	An output-based measure is...
Electricity generation	Boilers/steam turbines Reciprocating engines Combustion turbines	pounds per megawatt hour (lbs/MWh)
Steam or hot water generation	Industrial boilers Commercial boilers	pounds per million British Thermal Units (lbs/MMBtu $_{heat\ output}$)
Mechanical power	Reciprocating engines	grams/brake horsepower-hour (g/bhp-hr)

Output-based Measurement is Not New

◆ Recip engines use g/bhp-hr

◆ Many industrial processes measured in lb emissions/unit of product (cement clinker, melted glass or metal)

◆ Auto CAFÉ standards in g/mi

But the common power generation and steam boiler sources have not used this format.

Why Adopt Output-based Regulation?

◆ Recognizes/ incentivizes:
- – Efficiency
- – Renewables
- – Pollution prevention

◆ More accurate/consistent emission measurement.

Emission Reduction Benefits
of Efficiency

◆ Creates multi-pollutant emission reductions

◆ No start-up/shut-down emissions

◆ Reduced fuel use

◆ Avoids upstream and secondary pollutants

◆ Lower compliance costs

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How Have Output-Based Regulations Been Applied?

◆ Conventional Rate Limits

◆ DG Regulations

◆ Emission Trading Programs

◆ State Multi-pollutant Programs

◆ Federal Multi-pollutant Programs

◆ Generation Performance Standards

◆ Greenhouse Gas Registry

◆ New Source Review

Output-based Emission Standards

◆ Relate emissions to productive output, i.e., lb/MWh, lb/MMBtu$_{out}$.

◆ Account for increased process efficiency such as combustion efficiency, heat recovery, reduced parasitic losses.

– Not related to efficiency of energy end use, (i.e., the light bulb).

◆ Allow efficiency and renewables to be used as part of the emission control strategy.

Issues for Output-based Regulation

◆ Output-measurement – both electricity and thermal output can be reliably and accurately measured.

◆ Set standards – can be based on new data or conversion from input-based standards.

◆ Transaction costs – cost of documentation, application and administration can be a deterrent for smaller renewable, efficiency and CHP projects.

Allowance Trading Programs

- ◆ Establish emissions tonnage cap for group of affected sources.

- ◆ Distribute emission allowances equal to the cap.

- ◆ Each plant must hold allowances equal to its emissions at the compliance point.

- ◆ Plants can buy or sell allowances.

The Role of Allocation

◆ Emission allowances must be distributed at the beginning of the program - distributing the "chips" in the trading system.

◆ Allocation does not determine the near-term compliance strategy but does affect profitability of individual plants or companies.

– Can encourage the development of new, clean technologies.

Allocation Options

◆ Emission-based – based on historic emissions – rewards historic high emitters.

◆ Input-based – based on historic fuel consumption – rewards less efficient plants.

◆ Output-based – based on historic generation – rewards more efficient plants.

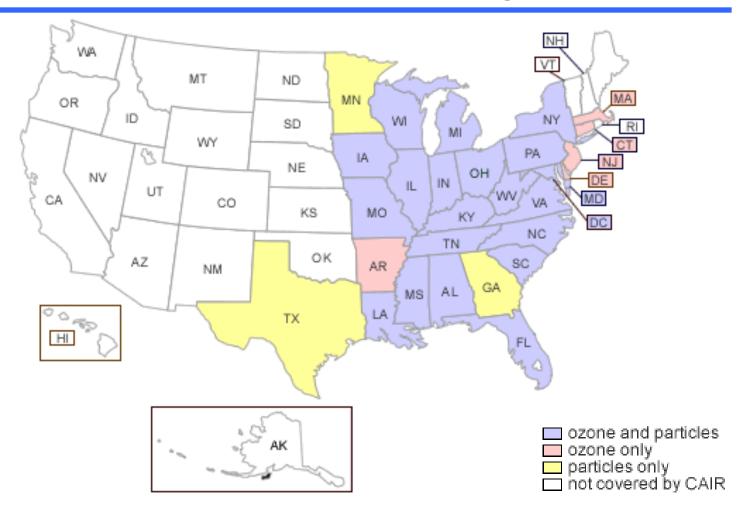 – Can include renewables and thermal output of CHP facilities.

Allocation Example: CAIR

◆ Clean Air Interstate Rule - regulates NO_x, SO_2 in 28 eastern states.

  – NO_x is the primary target for allocation.

◆ Allocation process left to the states. EPA has provided model language.

  – Can be easily extended to include CHP and renewables.

CAIR Coverage

Legend:
- ozone and particles
- ozone only
- particles only
- not covered by CAIR

CAIR Model Rule

◆ Output-based allocation for new (2001+) generators.

◆ Thermal output included for new CHP generators.

◆ Easily expanded to include renewables.

◆ Treatment of CHP can be improved.

STAPPA/ALAPCO Model

◆ Provides model rule language for direct allocation and renewable energy setasides as well as other NO_x allowance allocation options.

◆ *Alternative NO_x Allowance Allocation Language for the Clean Air Interstate Rule* (August 2005) http://www.4cleanair.org/Bluestein-cairallocation-final.pdf

Summary

◆ Output-based regulation can be used in many regulatory programs to encourage renewables and various forms of energy efficiency, including CHP.

◆ Many states have already implemented such programs and there is a variety of resources available to assist in future program development.